

# MPE

## TEST REPORT

ISSUED BY  
Shenzhen BALUN Technology Co., Ltd.



FOR  
**Hub E1**

ISSUED TO  
Konec Solutions Pty Ltd

Level 3, 5 Talavera Rd, Macquarie Park NSW 2113 Australia



Tested by:

*Liyao Zong*

Zong Liyao

Date

Feb. 10, 2022

Approved by:

*Wei Yanquan*

Wei Yanquan  
(Chief Engineer)

Date

Feb. 10, 2022

Report No.: BL-SZ21C0870-701

EUT Name: Hub E1

Model Name: HE1-G01

Brand Name: Aqara

Test Standard: Radiation Protection Series No. 3: 2002  
AS/NZS 2772.2: 2016

Test Conclusion: Pass

Test Date: Jan. 05, 2022 ~ Jan. 20, 2022

Date of Issue: Feb. 10, 2022

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**Revision History**

<u>Version</u>	<u>Issue Date</u>	<u>Revisions Content</u>
<u>Rev. 01</u>	<u>Feb. 10, 2022</u>	<u>Initial Issue</u>

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# 1 GENERAL INFORMATION

## 1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China.
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

## 1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

## 1.3 Test Environment Condition

Ambient Temperature	20°C to 23°C
Ambient Relative Humidity	30% to 60 %
Ambient Pressure	100 KPa to 102 KPa

## 1.4 Announce

- (1) The test report reference to the report template version V2.0.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
- (7) . The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

## 2 PRODUCT INFORMATION

### 2.1 Applicant Information

Applicant	Konec Solutions Pty Ltd
Address	Level 3, 5 Talavera Rd, Macquarie Park NSW 2113 Australia

### 2.2 Manufacturer Information

Manufacturer	Lumi United Technology Co., Ltd
Address	8th Floor, JinQi Wisdom Valley, No.1 Tangling Road, Liuxian Ave, Taoyuan Residential District, Nanshan District, Shenzhen, China

### 2.3 Factory Information

Factory	N/A
Address	N/A

### 2.4 General Description for Equipment under Test (EUT)

EUT Name	Hub E1
Model Name Under Test	HE1-G01
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	T0
Software Version	3.2.4_0028
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

### 2.5 Ancillary Equipment

Note: Not applicable.

## 2.6 Technical Information

Network and Wireless connectivity	Wi-Fi 802.11b, 802.11g, 802.11n Zigbee
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The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	Wi-Fi; Zigbee	
Operating Frequency	802.11b/g	2400 ~ 2483.5 MHz
	802.11n(HT20)	2400 ~ 2483.5 MHz
	Zigbee	2400 ~ 2483.5 MHz
Antenna Type	WLAN	PCB Antenna
	Zigbee	PCB Antenna
Exposure Category	General Population/Uncontrolled Exposure	
EUT Stage	Fixed Device	

### 3 STANDARD INFORMATION

#### 3.1 Test Standard

No.	Identity	Document Title
1	Radiation Protection Series No. 3: 2002	Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields - 3 kHz to 300 GHz
2	AS/NZS 2772.2:2016	Radiofrequency fields - Part 2: Principles and methods of measurement and computation - 3 kHz to 300 GHz

## 4 DEVICE CATEGORY AND LEVELS LIMITS

The field calculation does not take into account the antenna size, which is assumed to be a point source. An ideal isotropic antenna is used as a reference to compare the performance of practical antennas: **P** watts is radiated, from a point, uniformly over the surface of sphere of radius **r**. The POINTING VECTOR gives the power density:

Assumed use distance from EUT to Human, **20 cm** separation distance warning is required. In this section, the power density at 20 cm location is calculated to examine if it is lower than the limit.

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = power density

P = output power (W)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Separation distance between radiator and human body (m)

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the following limits.

### Compliance criteria

The worst case maximum exposure levels (Non Occupational) are given in Table 7 of the ARPANSA standard as shown below. The limits are given as Reference Levels which vary with the frequency. The General Public exposure category is applicable for this report.

**ARPANSA Standard, Table 7: Reference Levels for the Time Averaged Exposure to RMS Electric and Magnetic Fields**

Exposure Category	Frequency range	E-Field strength (V/m rms)	H-field strength (A/m rms)	Equivalent plane wave power flux density Seq (W/m <sup>2</sup> )
Occupational	100 kHz – 1 MHz	614	1.63 / f	—
	1 MHz – 10 MHz	614 / f	1.63 / f	1000 / f (see note 5)
	10 MHz – 400 MHz	61.4	0.163	10 (see note 5)
	400 MHz – 2 GHz	3.07 × f <sup>0.5</sup>	0.00814 × f <sup>0.5</sup>	f / 40
	2 GHz – 300 GHz	137	0.364	50
General Public	100 kHz – 150 kHz	86.8	4.86	—
	150 kHz – 1 MHz	86.8	0.729 / f	—
	1 MHz – 10 MHz	86.8 / f <sup>0.5</sup>	0.729 / f	—
	10 MHz – 400 MHz	27.4	0.0729	2 (see note 6)
	400 MHz – 2 GHz	1.37 × f <sup>0.5</sup>	0.00364 × f <sup>0.5</sup>	f / 200
	2 GHz – 300 GHz	61.4	0.163	10

**Note:**

1.  $f$  is the frequency in MHz.
2. For frequencies between 100 kHz and 10 GHz,  $S_{eq}$ ,  $E^2$  and  $H^2$  must be averaged over any 6 minute period.
3. For frequencies exceeding 10 GHz,  $S_{eq}$ ,  $E^2$  and  $H^2$  must be averaged over any  $9.6 \times 10^4 / f$  1.05 minute period (see note 1).
4. Spatial averaging of the time averaged reference levels of Table 7 should be performed according to the requirements of clause 2.7.
5. For occupational exposure, E and H reference levels of Table 7 are given in plane wave ratio at frequencies greater than or equal to 1 MHz. However, for many occupational exposure situations, equivalent plane wave power flux density is not an appropriate metric if 'far-field' exposure conditions do not apply. Survey meters may be calibrated in terms of W/m<sup>2</sup>, but both E and H will generally require independent measurement and evaluation if measured in the near-field.
6. For general public exposure E and H reference levels of Table 7 are given in plane wave ratio at frequencies greater than or equal to 10 MHz. However, equivalent plane wave power flux density is not an appropriate metric if 'far-field' exposure conditions do not apply. Survey meters may be calibrated in terms of W/m<sup>2</sup>, but both E and H will generally require independent measurement and evaluation if measured in the near-field.



## 5 MPE ASSESSMENT

### 5.1 Output Power

Zigbee			
Mode	O-QPSK		
	Low	Middle	High
EIRP (dBm)	9.9	9.9	9.6
Note: This report listed the worst case EIRP power value, please refer to RF test report for more details.			

2.4G Wi-Fi			
Mode	802.11b	802.11g	802.11n20
EIRP (dBm)	18.5	16.2	14.5
Note: This report listed the worst case EIRP power value, please refer to RF test report for more details.			

### 5.2 Assessment Result

Mode	Max. EIRP (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (W/m <sup>2</sup> )	Limit of Power Density (W/m <sup>2</sup> )	Verdict
Zigbee	9.9	1.0	20	0.0194	10	Pass
2.4G Wi-Fi	18.5	2.5	20	0.1408	10	Pass

### 5.3 Conclusion

This EUT is deemed to comply with the reference level limits by Council Recommendation 1999/519/EC, therefore the basic restrictions are compliant with human exposure limits.

--END OF REPORT--